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Earnings differentials between immigrants and natives: the role of occupational attainment

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Abstract

This paper brings new evidence to the existing literature on earnings differentials and returns to human capital for immigrants and natives. It is the first paper analysing this topic using data drawn from the Italian Labour Force Survey, a large nationally representative dataset. We show that returns to human capital are considerably lower for immigrants as compared to natives and that there is no return to pre-immigration work experience, suggesting imperfect transferability of human capital. In the second part of the paper we explore models of occupational attainment among immigrants and the native born. Our findings suggest that, contrary to what is observed for natives, immigrants' human capital does not contribute to getting access to high-paying occupations.

JEL classification: J31, J24, J61, F22

Keywords: Immigration; Earnings; Returns to human capital; Occupation

1 Introduction

In recent years, Italy experienced a marked increase in immigration. The population share of migrants rose very rapidly, from 1.1 per cent (738,000) in 1995 to 7 per cent (4,235,000) in 2010. EU enlargement, since 2007, further contributed to the increasing of migration flows from eastern European countries. Migrants are generally younger and more active in the labour market; hence, when computed on the labour force, their share is close to 9 per cent (in 2010). This significant and rapid growth of immigrants constitutes a substantial (supply) shock, which is expected to affect both employment and earnings differentials of immigrants relative to natives. This paper investigates the process of wage determination for migrants and natives.

Empirical research has shown, for different countries, that wages and returns to human capital are generally lower for immigrants as compared to the native-born (Chiswick 1978, Dustmann 1993, Baker and Benjamin 1994, Shields and Wheatly Price 1998, Friedberg 2000, Chiswick and Miller 2008). This is often explained with reference to the low portability of immigrants' human capital (i.e., pre-immigration education and work experience). Due to the poor quality of data with information on migrants, in Italy we lack sound empirical evidence – based on nationally representative data – on immigrants' earnings differentials.[1] The existing studies that have investigated the migrants pay gap in Italy either used administrative archives or surveys limited to specific regions. Accetturo and Infante (2010) analyse earnings differentials in a

large Italian northern region (Lombardy). Given the cross sectional nature of the data, they are not able to identify assimilation. They find that returns to education for immigrants located in this region are, on average, much lower as compared to natives (0.7 to 0.9 per cent *versus* 4.7 to 6.1 per cent). They also show that immigrants' returns to education, when compared to natives, remain low even over time, which they interpret as lack of assimilation. It should be noted, however, that Lombardy is one of the most economically advanced region in Italy, and it can not be considered as representative of overall Italian migration. Venturini and Villosio (2008) use administrative panel data drawn from the social security archives (INPS) to investigate the labour market assimilation of foreign workers in Italy. Their analysis focuses on earnings and employment status of male workers. However, a severe shortcoming of these data is that there is no information on educational attainment of both migrants and natives such that it is not possible to estimate the contribution of education to the assimilation process, which is instead one of the main contributions of our paper. They find no differences in earnings between immigrants and natives at the beginning of the working life, but earnings profiles diverge over time with work experience, pointing to a lack of assimilation that is persistent. Battisti (2013) uses the INPS Veneto Worker History dataset, an administrative longitudinal linked employer-employee dataset that covers the population of private-sector workers of the Italian administrative region of Veneto for the years 1982–2001, and documents a large and growing wage gap between foreign-born and native-born workers. However, the focus on a single Italian region (Veneto) and the lack of information on educational attainment are both limiting factors in terms of national representativeness and in providing evidence on migrants' returns to education.

This paper brings new evidence to the existing literature on earnings differentials and returns to human capital for immigrants and native Italians. To our knowledge, this is the first paper which uses a large representative dataset with information on both earnings and foreign status (i.e., Italian Labour Force Survey, LFS) to investigate earnings differentials and the role of human capital (both education and work experience) at the national level. The Italian case is particularly interesting since the share of highly educated migrants is one of the lowest among OECD countries. In 2007 migrants with tertiary attainment were just 12.2 per cent (a lower value is found only for Austria, 11.3 per cent, and Poland, 11.9 per cent). This sharply contrasts with the migration pattern of countries such as Ireland or Canada, where the same share is around 40 per cent.[2]

One limitation, however, that our papers shares with other studies using cross-sectional data is that there are serious threats to identification of the labour market assimilation of foreign workers. In this case, as shown in the literature, the parameters of interest may be confounded with immigration cohort quality (Borjas, 1985), selective out-migration (Lubotsky, 2007) or age-at-arrival effects. Nonetheless, most studies which focus on the effects of immigration on earnings are usually forced to use large cross-sectional data (Census, Labour Force Surveys) because large datasets are needed to guarantee representativeness of the immigrant population (see, for example, Chiswick and Miller, 2007 and Friedberg, 2000). The limits related to cross section data analysis will be discussed when presenting the econometric results and in the interpretation of coefficient estimates.

We distinguish between the effects of human capital acquired domestically and abroad on earnings and investigate the patterns of immigrants' skill transferability.

We allow for differences in the returns to human capital (both education and work experience) between immigrants and natives and for differences in returns to home and destination country work experience (Friedberg 2000).[3]

In line with previous findings, we show that returns to immigrants' education are lower as compared to that of natives. We also find that pre-immigration work experience grants no returns in the Italian labour market and that years of post-migration labour market experience are rewarded at a considerably lower rate for immigrants when compared to natives. Our main results are confirmed for specific migrant groups defined according to their country of origin and to their age at immigration.

Our paper also contributes to the analysis of occupational attainment among immigrants and the native born. In particular, we analyse the role of human capital in governing the allocation of immigrants, as compared to native workers, in the occupational hierarchy (Chiswick and Miller 2007). Our findings suggest that wage differentials for immigrants take place mainly within, rather than between, occupations. In other words, contrary to what is observed for natives, immigrants' human capital does not seem to contribute to getting access to high-paying occupations. This contrasts with the empirical evidence provided by Chiswick and Miller (2007) for the US, where they show that education is the key factor for immigrants, determining access to high-paying occupations as compared to natives. The latter may show the existence of occupational segregation in the Italian labour market, which we interpret as a "glass-ceiling" effect for immigrant workers located in the upper part of the wage distribution. The above results prove robust to a number of alternative specifications.

The rest of the paper is organised as follows. The next section describes the data used and presents some descriptive evidence. Section 3 presents different specifications for wage equations and compares returns to human capital of immigrants and natives. In section 4, we estimate both inter-occupational and intra-occupational wage differentials as well as their patterns over the earnings distribution using quantile regressions. Section 5 presents some sensitivity checks, while section 6 concludes.

2 Data and descriptive statistics

We use data drawn from the 2009 wave of the Italian Labour Force Survey (LFS), a nationally representative dataset with information on workers' earnings as well as a foreign identifier (i.e., individuals with non-Italian citizenship).[4] Country of birth is often used, instead of nationality, to define migrant status; note however that in our dataset, the two definitions are equivalent since all but eight non-Italian citizens are also foreign-born. The LFS only covers foreigners registered at municipal registry offices; hence, the study does not consider illegal immigration. We restrict our sample to migrants from Eastern Europe, Asia, Central and South America and Africa, while we exclude foreigners from EU15, North America, Oceania and Japan.[5] As commonly done in the literature (among others, Baker and Benjamin 1994 and Chiswick and Miller 2007), we focus the analysis on males only. Indeed, female migration patterns have been shown to be quite different from that of males, both in terms of purposes (i.e., family reunions) and with respect to the specific labour market segment where it is concentrated (mainly the household service sector). Our final sample contains 94,269 individuals, with 7,252 (7.69 per cent) immigrants and 87,017 (92.31 per cent) Italian

citizens.[6] Our variable of interest, as recorded in the LFS, is net monthly earnings (which excludes occasional elements of pay such as annual productivity bonuses, allowances, pay for non-customary overtime, etc.).

Table 1 shows some basic characteristics of the sample separately for immigrants and natives.[7] Average monthly earnings are much lower for immigrants (–20 per cent) as compared to Italians, while working hours are higher for the latter group. Immigrants are younger (5 years), have resided in Italy on average for 10 years, and their work experience, while being, on average, lower, is almost equally split between Italy and their country of origin.[8] Moreover, immigrants tend to be less educated (approximately 1.5 years)[9] and more frequently hired on "non-standard" contracts (15 *versus* 10 per cent). Finally, immigrants are mainly located in Northern regions, as compared to Italians (68 *versus* 48 per cent), while they are under-represented in the South (11 *versus* 36 per cent).

Table 2 reports average earnings across quartiles of the distribution separately by education and work experience for natives and immigrants – i.e., for the latter both pre-immigration and post-immigration measures are reported.[10] Earnings levels are positively associated with both education and work experience for both natives and immigrants, but the relationship is stronger for natives: comparing the first quartile with the fourth quartile, average education is 3 years higher for natives and only 1.1 years higher for immigrants. The same holds for overall work experience: from the first to the fourth quartile, average work experience ranges from 21 to over 27 years for Italians and from 21 to 23 years for immigrants.[11] At a descriptive level, the evidence presented shows that earnings levels are higher and exhibit a steeper progression along the distribution for Italians as compared with immigrants.

3 Earnings equations and the immigrants' wage differential

We specify a standard human capital earnings equation, which represents our workhorse model,

$$ln(w_i) = \alpha + \delta_0 WT_i + \delta_1 M + \delta_2 ED_i + \delta_3 (ED_i * M) + \delta_4 EXP^H{}_i + \delta_5 EXP^D{}_i + \delta_6 \left(EXP^D{}_i * M\right) + \delta_7 X_i + \mu_i \quad (1)$$

Table 1 Summary statistics

	Natives		Immigrants	
	Mean	*Std. Dev.*	*Mean*	*Std. Dev.*
Net monthly wage	1372.50	563.79	1097.71	343.74
Weekly working time	39.13	6.92	40.19	6.93
Age	41.85	10.94	36.99	9.32
Education (years)	10.94	3.46	9.36	3.95
Work experience (natives)	24.91	11.75	-	-
Pre-immigration work experience	-	-	11.80	8.73
Post-immigration work experience	-	-	9.82	5.60
Years since migration	-	-	10.05	5.61
Full time	0.96	0.20	0.94	0.24
Married	0.61	0.49	0.59	0.49
Permanent worker	0.89	0.31	0.85	0.36
Nr obs	87017		7252	

Table 2 Distribution of human capital by wage quartiles

	Natives			Immigrants				
	Education	*Work experience*	*Monthly net wage*	*Education*	*Work experience*	*Pre-immigration work experience*	*Post-immigration work experience*	*Monthly net wage*
Wage quartile								
1	9.87	21.23	830.73	8.75	20.76	12.09	8.66	712.87
2	10.06	25.06	1175.75	9.26	21.07	11.8	9.29	1033.72
3	10.92	26.06	1403.22	9.67	21.89	11.64	10.22	1189.18
4	12.92	27.3	2082.1	9.84	23	11.65	11.36	1496.51

where $ln(w_i)$ is the log of net monthly earnings, WT is weekly hours worked, M is a dummy variable for immigrant status, ED is education in years, and EXP is potential work experience, which, for migrants, is split between the part acquired in the home country (EXP^H, H=home) and the part acquired in the destination country (EXP^D, D=Destination).[12] The interaction terms with the immigrant dummy allow for the returns to education (ED_i*M) and experience (EXP^D*M) to differ between natives and migrants, while X is a vector of personal and job characteristics (marital status, full-time, permanent job).[13] Note that the term EXP^D*M is usually measured as 'years since migration' and interpreted as capturing the yearly returns to migration (i.e., since arrival in Italy). The coefficient on the immigrant dummy M virtually measures the (expected) earnings gap between immigrants and natives upon arrival.

In our empirical analysis, we first estimate a restricted version of equation (1) where we set the returns to schooling for both immigrants and Italians to be the same (i.e. $\delta_3=0$) and where we do not differentiate between pre- and post-immigration work experience for immigrants (i.e. $\delta_4=\delta_5$). We then release the above restrictions and estimate the more flexible specification shown in equation (1), which allows for differences in the returns to human capital between immigrants and natives and for differences in the returns to home and destination country work experience. For immigrants, the overall returns to education are given by $\delta_2+\delta_3$, while the returns to post-immigration work experience are $\delta_5+\delta_6$. Discrimination, occupational segregation or imperfect transferability of human capital in the Italian labour market will show-up as a negative sign on the coefficients of the interaction terms δ_3 and δ_6 – for schooling and experience, respectively– which represents the earnings penalty that immigrants face with respect to native workers.

The various specifications of equation (1) that we estimate – i.e., restricted and unrestricted as well as with and without additional controls – are reported in Table 3. When returns to education and experience are restricted to be the same between immigrants and natives (columns 1 and 2), we find a 10 per cent earnings penalty for immigrants upon arrival (7.7 per cent when controlling for industry and firm size). Interestingly, the coefficient on work experience in Italy for immigrants is negative and statistically significant in the first column, suggesting that immigrants' relative earnings decrease by 0.2 per cent per year after migration. However, when controlling for industry and firm size, the coefficient is no longer statistically significant. A direct comparison of estimated coefficients suggests that the earnings penalty following migration is partly due to immigrants' concentration in small firms or low-wage industries. Estimated returns

Table 3 Baseline earnings equation

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Immigrant	−0.1039***	−0.0772***	0.4222***	0.3428***	0.2082***	0.1754***
	(0.008)	(0.007)	(0.016)	(0.016)	(0.016)	(0.016)
Education	0.0453***	0.0360***	0.0493***	0.0402***	0.0246***	0.0215***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Experience abroad			−0.0005	0.0001	0.0002	0.0005
			(0.000)	(0.000)	(0.000)	(0.000)
Experience in Italy			0.0082***	0.0069***	0.0060***	0.0054***
			(0.000)	(0.000)	(0.000)	(0.000)
Education x immigrant			−0.0414***	−0.0336***	−0.0193***	−0.0165***
			(0.001)	(0.001)	(0.001)	(0.001)
Experience in Italy x immigrant			−0.0048***	−0.0032***	−0.0025***	−0.0017***
			(0.001)	(0.001)	(0.001)	(0.001)
Experience	0.0077***	0.0064***				
	(0.000)	(0.000)				
YSM	−0.0019***	−0.0009				
	(0.001)	(0.001)				
Constant	5.4179***	5.4541***	5.3605***	5.3995***	6.2061***	6.2503***
	(0.013)	(0.015)	(0.013)	(0.015)	(0.021)	(0.024)
Observations	93,982	93,982	93,982	93,982	93,982	93,982
R-squared	0.407	0.445	0.417	0.451	0.482	0.502
Personal and job characteristics	YES	YES	YES	YES	YES	YES
Regional fixed-effects	YES	YES	YES	YES	YES	YES
Industry fixed-effects and firm size	NO	YES	NO	YES	NO	YES
Occupations	NO	NO	NO	NO	YES	YES

Robust standard errors in parentheses. Control for working time is included in all specifications.
***p<0.01.

to education and work experience are, respectively, 4.5 and 0.77 per cent (column 1) and 3.6 and 0.64 per cent (column 2) when additional controls are included. The restricted version, however, is easily rejected by the data. When we fit the unrestricted specification, as reported in equation (1), the estimated returns to education are, respectively, 4.9 and 4 per cent for natives and 0.79 and 0.66 per cent for immigrants (see columns 3 and 4).

Incidentally, given that almost all immigrants in our sample completed their education in their country of origin, an important point to raise is whether the quality of schooling is effectively comparable between origin and destination country. Should the latter not to be true, differences in returns could reflect the imperfect transferability of degree due to differences in the quality of schooling between countries. In order to check the robustness of our result, we replicated the analysis controlling for a measure of country's school quality. In particular, we used information drawn from the OECD's "Programme for International Student Assessment" (PISA) regarding the average test score in mathematics and science from primary through end of secondary school (as in Hanushek and Woessmann 2009). Our results proved to be largely unaffected (See the Additional file 1: Table S1 for results).[14]

In the last two columns of Table 3, we also add a large set of occupational dummies and estimate the model both including (column 6) and not including (column 5) industry and firm-size dummies. In both cases the returns to education for both natives and immigrants are further reduced. We will further delve into this issue in the following section.

The returns to work experience also offer some interesting insights. First, pre-immigration work experience seems not to be valued in the Italian labour market. Second, there is a penalty for immigrants (as shown by the negative and statistically significant coefficient of the interaction term, δ_6 in equation 1) on the returns to work experience.

Particular care should be used in interpreting these results due to the cross-sectional nature of the data and the potential selection bias induced by return migration. For instance, if the most successful migrants are more likely to return to their country of origin, least squares estimates of work experience in the destination country are likely to be biased downward. Moreover, since the contribution of Borjas (1985), it is well known that working with a cross-section can lead to bias in the estimation of the relationship between years since migration and work experience in the destination country and wages (cohort effects). In this case, for instance, if the more recent immigration cohorts have a lower (higher) unobserved ability, least squares estimates will lead to an upward (downward) bias in the estimated coefficient of work experience in Italy.

In order to adequately address these issues, longitudinal data are needed. In this respect, Venturini and Villosio (2008) is the only paper that analyses wage differentials for migrants using a nationally representative panel dataset. Although data limitations do not allow them to study the role of education in the assimilation process, their findings are close to ours. Namely, they find that immigrants' and natives' wage profiles diverge with on-the-job experience. More importantly, for the purpose of our paper, they show that even when selective return migration and cohort effects are taken into account, the main results still hold. This may suggest that cohort effects do not play a major role in Italian migration patterns. One explanation may be related to the fact that immigration is a relatively recent phenomenon in Italy: our data show that 85% of migrants arrived in Italy less than 15 years before 2009, the date of the survey we are using. Hence, it can be argued that cohort quality may not have changed much across the various waves of migration in such a relatively short period. As a partial attempt to control for potential changes in cohort quality, we re-estimated equation (1) adding cohort dummies interacted with the immigration dummy. These cohort dummies intend to capture some cohort-specific unobserved characteristics affecting migrants' wage. Results are largely unchanged.

Overall, we find that returns to human capital in the destination country (both education and work experience) are considerably lower for immigrants as compared to natives.[15] The findings that immigrants receive no return to their pre-immigration work experience and that foreign education is valued less than domestic education are common to other studies in the literature (among others, Friedberg 2000 and Chiswick and Miller 2008).

Finally, it is interesting to notice that the earnings gap between natives and immigrants upon arrival is mainly explained by the lower returns to immigrants' human capital: the gap is close to zero (other things being equal) when both natives and immigrants have (roughly) ten years of schooling, and it becomes negative at higher levels of schooling, while work experience matters less.[16]

3.1 Estimates by area of origin and by age at immigration

In order to investigate heterogeneity across different groups of the immigrant population, we now extend the analysis to assess whether the estimated effects are different according to the area of origin. Considering our sample of male employees, the most represented national groups who are resident in Italy are: Romanians (19.3 per cent), Albanians (16.2 per cent) and Moroccans (11.9 per cent), followed by migrants from the former Yugoslavia (Macedonia, Kosovo, Serbia, Bosnia-Herzegovina and Croatia, 8 per cent), India (5.8 per cent), Philippines (3.2 per cent) and Tunisia (3.1 per cent). We re-estimate the human capital penalty for immigrants specifying a dummy for each immigrants' groups. More specifically, we defined the following immigrant groupings: Eastern Europe, Africa, Asia (excluding Japan) and Latin America. Results are reported in Table 4. With respect to returns to education, the highest penalty is found for Asian migrants and the lowest for Latin-Americans. This finding may indicate, as shown in the literature, that language skills play an important part in the returns to human capital: Spanish-speaking migrants from Central and South America – given the greater lexical proximity between the Spanish and the Italian languages – are more likely to become proficient in Italian as compared to Asian.

The education penalty, however, is rather large also for some immigrant groups from Eastern Europe and some Balkan countries, including Romanians and Albanians, whose proficiency in Italian is generally rather good.[17] Experience in the home country is not valued for any migrant group, while an interesting result emerges when considering work experience in Italy: we find no penalty for immigrants from Europe and Latin America, while for Asians and Africans work experience in the destination country is less valued as compared to native workers.

Table 4 Estimates by area of origin and by age at immigration[a]

	Wage penalty		Return on pre-immigration work experience
	Education	Post-migration work experience	
Area of origin			
Eastern Europe	−0.0419***	−0.0015	Ref
	(0.001)	(0.001)	
Africa	−0.0413***	−0.0045***	0.0002
	(0.002)	(0.001)	(0.001)
Asia	−0.0454***	−0.0065***	−0.0012
	(0.002)	(0.002)	(0.001)
Latin America	−0.0377***	−0.0047	−0.0004
	(0.004)	(0.003)	(0.002)
Age at immigration			
Less or equal to 20	−0.0386***	−0.0017	Ref
	(0.003)	(0.001)	
More than 20	−0.0424***	−0.0058***	−0.0011**
	(0.001)	(0.001)	(0.001)

Robust standard errors in parentheses.
***p<0.01, **p<0.05.
[a]specification as in columns 3 of Table 3.

We might expect that immigrants that arrived in Italy at young ages perform differently from migrants that arrived later in their life (young *versus* adult at migration). Differences in age at immigration can influence labour market outcomes in different ways. For example, younger immigrants are more likely to have obtained some schooling in the host country, which typically yields a higher return than schooling in the source country.[18] Alternatively, older immigrants may face greater difficulty than younger immigrants with acculturation and adjustment to the linguistic and cultural challenges associated with living in a new country (Schaafsma and Sweetman 2001). We group age-at-arrival into two groups (below and above 20) to break the linear dependence with the parameters of the model and estimate the effect of belonging to one of these groups relative to the other. Of course, also in this case, given the cross-sectional nature of the data, age-at-immigration effects are only indicative because they could be confounded with cohort effect.

The interaction terms show that the immigrants' penalty in the return to education is lower for younger immigrants – i.e., arrived in Italy before they are 20 (and with more than 10 years of schooling) – while for older immigrants – i.e., arrived after they are 20 – returns are lower (see Table 4).[19] Finally, we find that for younger immigrants, returns to post-migration work experience are not statistically different from that of native workers, while for older immigrants, a longer experience in the country of origin is associated with lower wages in Italy.[20]

4 Earnings and occupational attainment

Workers' progression in the earnings distribution can be virtually decomposed into the part which occurs through access to high-paying occupations and the part which only occurs within occupations. In other words, the returns to additional years of schooling and additional years of experience can affect workers' occupational attainment both in terms of access to high-paying occupations and returns within occupations. We investigate the inter-occupational and intra-occupational earnings progression comparing the gross returns to education and work experience with the corresponding returns within occupation, holding occupational attainment fixed, for both immigrants and natives. The inclusion of occupational controls on the right-hand side of wage equations has to be handled with care since both wages and occupations may be a proxy for immigrants' labour market performance. Still, as stressed in Chiswick and Miller (2007), the inclusion of occupational dummies may be justified when the focus of the analysis is on the channels through which earnings progression occurs (Groshen 1991). In this respect, we investigate whether there is any earnings penalty for immigrants which occurs *via* a reduced occupational attainment or lower returns within occupation. The relevance of these features in wage determination is empirically evaluated by augmenting our specification of the earnings equations, separately for immigrants and natives, with a wide array of occupational dummies.[21] Then, comparing estimates of earnings equations with and without controls for occupations – that is, with and without occupational fixed effects – allows us to assess the returns to human capital that exclude the effects of the inter-occupational wage progression. The conditional returns to human capital can be interpreted as the component of the payoff due to intra-occupational earnings progression. Since the distribution of immigrants and natives across occupations is unlikely to be random (as shown in the following

Figure 1), we do not interpret the structure of inter-occupational earnings differentials and focus mainly on the effect of human capital variables (i.e., schooling and work experience) on earnings.

Figure 1 describes the actual distribution of immigrants and natives across occupations using the 2-digit ISCO classification, which consists of 37 occupational groups. In panel (a), occupational groups are ranked (from low to high) using the average level of education, while in panel (b), the within-occupation average wage is used instead. The (unconditional) distribution of immigrants across occupations shows that they are more likely to be employed in low-skilled and low-paid jobs (see also the Additional file 1: Table S2), which may partly reflect differences in accumulated human capital and partly unobserved factors such as imperfect transferability or discrimination. In the latter case, even when immigrants have comparable levels of education and work experience to those of native workers, they may be paid less due to their concentration in low-ranked occupations.[22]

In Table 5, we report the estimates of earnings equations, this time separately for natives and immigrants – obtained replicating the same specifications shown in Table 3 – but conditioning on a set of occupational dummies. We find that the returns to schooling for native Italians, when occupational fixed effects are included, decrease from 4.9 per cent (column 1) to 2.4 per cent (column 2), close to a 50 per cent reduction. In a similar way, but much smaller in magnitude, returns to schooling for immigrants decrease when we condition on occupational dummies: the coefficient on schooling decreases from 0.86 per cent (column 4) to 0.68 per cent (column 5), corresponding to a 20 per cent reduction. This means that while for Italians almost half of the overall education payoff is associated with having access to high-paying occupations, for immigrants, only 20 per cent of the (already quite modest) returns to education originate from access to high-paying occupations. For both groups, the remaining part of the returns to education is related to higher wages obtained within occupations.

The returns to work experience, calculated before and after controlling for inter-occupational pay differentials, also prove informative. The payoff to work experience for Italians shows a decline from 0.82 per cent (column 1) to 0.58 per cent (column 2), equivalent to a 29 per cent reduction, thus suggesting that only a minor part of the earnings progression is achieved *via* access to high-paying occupations.

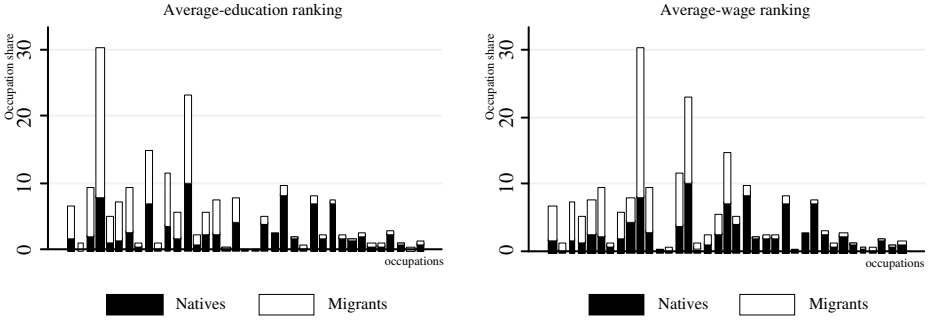

Figure 1 Distribution by occupations – natives and immigrants.

Table 5 Earnings and occupations

	Natives			Immigrants		
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Education	0.0492***	0.0243***	0.0226***	0.0086***	0.0068***	0.0069***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Work experience	0.0082***	0.0058***	0.0058***	-	-	
	(0.000)	(0.000)	(0.000)			
Pre-immigration work experience	-	-		0.0007*	0.0016***	0.0015***
				(0.000)	(0.000)	(0.000)
Post-immigration work experience	-	-		0.0048***	0.0054***	0.0056***
				(0.001)	(0.001)	(0.001)
Observations	86,800	86,800		7,182	7,182	7,182
R-squared	0.413	0.481		0.333	0.382	0.401
Personal and job characteristics	YES	YES	YES	YES	YES	YES
Regional fixed-effects	YES	YES	YES	YES	YES	YES
Industry fixed-effects and firm size	NO	NO	NO	NO	NO	NO
Occupations	NO	YES (2 digit)	YES (3 digit)	NO	YES (2 digit)	YES (3 digit)

Robust standard errors in parentheses. Control for working time is included in all specifications.
***p<0.01, *p<0.1.

For immigrants, we find that post-migration work experience is hardly affected when occupation dummies are included. Nonetheless, this result should be taken with some caution. Given that post-immigration work experience is a direct function of immigration cohort, the small variation in the post-migration coefficient observed for migrants could be driven by cohort differences in occupational attainment. More specifically, it might be that the older cohorts have relatively poor occupational attainment, masking part of the immigrants' across-occupation wage differentials. However, we compared the distribution by occupation of older cohorts to that of younger cohorts (using different thresholds for defining older and younger cohorts, i.e., arrival before/after 1995 and before/after 2000) and we found them to be very similar. Still, we cannot exclude that cohort effects may bias our result if other unobservable differences exist between different cohorts of migrants that are also characterised by different post-immigration work experience.

With respect to the payoff to pre-immigration work experience (i.e., accumulated in the home country), we find that it increases with respect to the unconditional model.[23] This positive effect suggests that while experience accumulated in the destination country seems to add almost nothing to the (inter-occupation) wage differential of immigrant workers, more years of pre-immigration experience (conditional on years since migration) appear to influence immigrants' over-representation into low-paying occupations. This result is in line with earlier findings in the literature and has been often rationalised with reference to both the imperfect transferability of skills across countries as well as considering that immigrants' skills become more country-specific with longer work experience in the origin (see Chiswick 1978 and Chiswick and Miller 2007). Moreover, pre-immigration work experience is strictly related to age-at-immigration, and immigrant outcomes in the host country labour market appear to decline with increasing age-at-immigration (Goldman et al. 2011).

In order to check whether the decomposition of the returns to education and experience into intra- and inter- occupational earnings differences is sensitive to the level of aggregation in the occupational categories, we replicated the previous exercise using a three-digit occupation classification, corresponding to 121 different occupations. While it may be reasonable to expect that when using more detailed occupational categories, the between occupation earnings differential component increases, we find very similar results as compared to those using the two-digit classification with 37 occupational groups (see columns 3 and 6 of Table 5).[24]

Overall, our results confirm that the returns to immigrants' human capital are generally very low. Moreover, it seems that the modest increase in earnings associated with improvement in education and experience occurs mainly through intra-occupational progression rather than through access to high-paying occupations.

4.1 Quantile regression analysis

In order to explore better the patterns of earnings differentials for immigrant and native workers along the entire wage distribution, in this section we re-estimate the returns to human capital using quantile regressions (Buchinsky 1998). In particular, we focus attention on the penalty that immigrant workers face, as compared to natives, in the overall returns to educational achievements at different deciles of the distribution.[25] The results are summarised in Figure 2, where we plot at each decile the coefficient estimates (and their confidence intervals) of the schooling variable interacted with the immigrant dummy (i.e., δ_3 in equation (1)), first excluding (panel a) then including occupational dummies (panel b)[26]. The mean penalty estimated with OLS, as in columns 3 and 5 of Table 3, is also reported for comparison purposes.

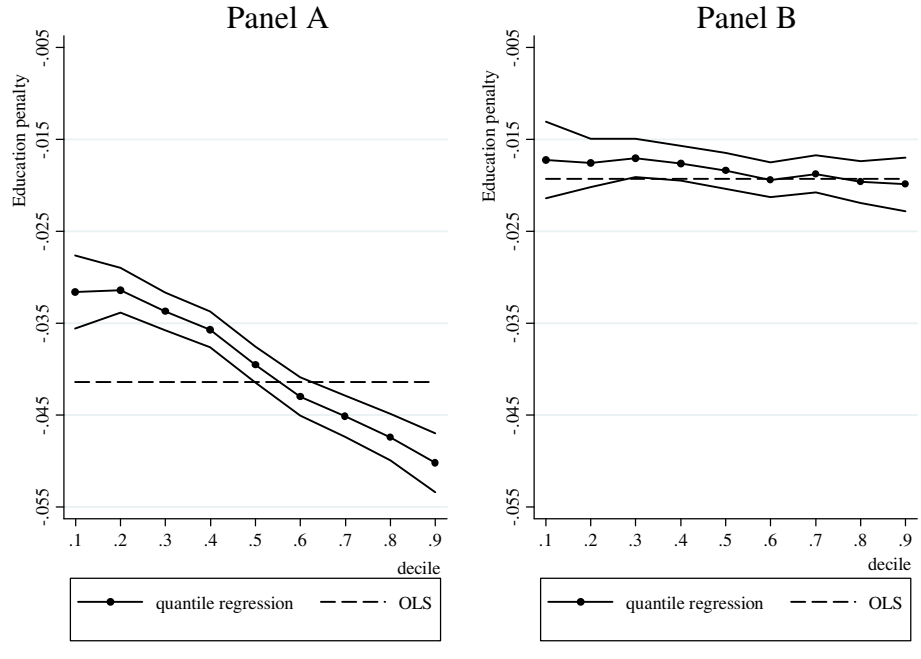

Figure 2 Education penalty for immigrants. (A) Without occupational dummies **(B)** With occupational dummies.

Results show that, when occupational controls are excluded (panel A), the estimated penalty for immigrants increases along the earnings distribution: from −3.2 per cent at the first decile to −5 per cent at the top of the distribution (OLS is −4.1 per cent). This result is consistent with previous findings suggesting that for natives the payoff to education, both in terms of access to high paying occupations and earnings progression within each occupation, increases along the deciles of the earnings distribution. Conversely, for immigrants, the payoffs are far less pronounced (Chiswick et al. 2006). When occupational fixed effects are added (panel B), both the value and the gradient along the deciles of the distribution decreases (OLS is −1.6 per cent), and we cannot reject the null that the estimated penalty for immigrants is constant for majority of the earnings distribution (i.e., the estimated penalty is statistically different from OLS only at the first and third decile). This result suggests that most of the earnings penalty that immigrants face in the upper part of the distribution may be due to a "glass-ceiling" effect in accessing high paying occupations, while there is no equivalent penalty in terms of within occupation. This evidence reinforces the findings reported in the previous sections (see Tables 3 and 5), as the main differences between natives and immigrants over the earnings distribution are driven by the reduced returns in terms of access to high paying occupations. We interpret these findings as evidence of the imperfect transferability of educational achievements as well as to the existence of discrimination and occupational segregation.[27]

5 Robustness checks

In this section, we check the robustness of our results against alternative specifications of the models. First of all, in order to assess the contribution of inter-occupational wage progression (differentials), we re-estimate our model using the mean earnings level in each occupational group as dependent variable[28]. The results reported in Table 6 show that the payoffs to years of education and work experience are consistent with those reported earlier in Table 3: the part of the returns to education and to post-migration work experience that comes *via* access to high-paying occupations is much higher for native workers as compared to migrants, while the contribution of work experience in the home country to occupational earnings progression is still negative.

As a second check, our model is re-estimated enforcing a common support, in personal and job characteristics, between immigrants and natives. In practice, we estimate a propensity score for immigrant status using all the variables included in our model. We then sorted immigrants and native workers by their propensity score and dropped all workers that fell out of the common support. More specifically, to define the common support, we estimate a probit model where the migrant dummy is regressed on working time, education, work experience, dummies for full time, permanent worker and married individuals, firm size and regional, industry and occupations fixed-effects. While this is not commonly done in migration studies, there is evidence that immigrants often have quite different characteristics, as compared to natives, which could bias results.

Imposing a common support leads to a reduction of 5,436 observations in our sample, while results are largely unchanged (see Table 7). We just observe a

Table 6 Occupational attainment

	(1)	(2)
VARIABLES	**Natives**	**Immigrants**
Education	0.0387***	0.0043***
	(0.000)	(0.000)
Work experience (natives)	0.0035***	-
	(0.000)	
Pre-immigration work experience (immigrant)	-	–0.0008***
		(0.000)
Post-immigration work experience (immigrant)	-	0
		(0.000)
Constant	6.4638***	6.8659***
	(0.006)	(0.022)
Observations	86,800	7,182
R-squared	0.485	0.501
Personal and job characteristics	YES	YES
Regional fixed-effects	YES	YES
Industry fixed-effects and firm size	NO	NO

Robust standard errors in parentheses. Control for working time is included.
***p<0.01.

negligible reduction in the penalties of immigrants for both education and work experience.

6 Conclusions

This paper investigated earnings differentials between immigrants and natives in the Italian labour market. We used the 2009 Italian Labour Force Survey, which is the first nationally representative dataset with information on both earnings and foreign status. The analysis focused on the effect of human capital acquired abroad and domestically on earnings, allowing for differences in the returns to both education and work experience between immigrants and natives. In line with previous findings, we show that returns to human capital are considerably lower for immigrants with respect to natives. We find no statistically significant returns to pre-immigration work experience, suggesting the existence of imperfect transferability of human capital. We also explored the role of human capital, for immigrants and natives, in explaining inter-occupational and intra-occupational earnings progression. Our findings suggest that the returns to human capital for immigrants are limited to intra-occupational earnings progression, while, contrary to what is found for natives, there are no returns in terms of access to high-paying occupations. This result contrasts with the empirical evidence provided by Chiswick and Miller (2007) for the US, where they show that education is the key factor determining access to high-paying occupations for immigrants when compared to natives. Finally, we estimated quantile regressions to assess the effect of immigrants' human capital penalty along the earnings distribution. We show that immigrant workers face a "glass-ceiling" effect through a restricted access to high-paying occupations. Overall, our results suggest that there is little assimilation of immigrants to natives, confirming earlier findings in the literature for other countries.

Table 7 Baseline earnings equations - common support

	(1)	(2)	(3)	(4)
VARIABLES				
Immigrant	0.3980***	0.3293***	0.1972***	0.1675***
	(0.016)	(0.016)	(0.016)	(0.016)
Education	0.0475***	0.0390***	0.0238***	0.0208***
	(0.000)	(0.000)	(0.000)	(0.000)
Education x immigrant	−0.0398***	−0.0326***	−0.0186***	−0.0159***
	(0.001)	(0.001)	(0.001)	(0.001)
Work experience (natives)	0.0078***	0.0068***	0.0058***	0.0053***
	(0.000)	(0.000)	(0.000)	(0.000)
Pre-immigration work experience (immigrant)	−0.0006	0.0001	0.0001	0.0005
	(0.000)	(0.000)	(0.000)	(0.000)
Post-immigration work experience (immigrant)	−0.0045***	−0.0031***	−0.0024***	−0.0016***
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	5.3788***	5.4124***	6.2101***	6.2727***
	(0.014)	(0.015)	(0.026)	(0.028)
Observations	88,546	88,546	88,546	88,546
R-squared	0.416	0.451	0.481	0.500
Personal and job characteristics	YES	YES	YES	YES
Regional fixed-effects	YES	YES	YES	YES
Industry fixed-effects and firm size	NO	YES	NO	YES
Occupations	NO	NO	YES	YES

Robust standard errors in parentheses. Control for working time is included in all specifications.
***p<0.01.

While providing new and important evidence for the economic performance of migrants in the Italian labour market, some important questions are left for future research. For example, future studies should try to assess what part of the observed wage penalties for immigrant workers depends on imperfect transferability of educational attainment and what part is related to the existence of discrimination or occupational segregation in the Italian labour market.

Endnotes

[1]A number of studies have investigated the displacement effect of immigration on native workers' employment and wages for Italy. For example, Gavosto, Venturini and Villosio (1999) find no effect of immigration on natives' earnings and mixed results for (un)employment.

[2]Moreover, OECD's evaluations suggest that Italy is the country with the lowest tendency to attract more highly educated immigrants on average, given its country of origin mix (OECD, 2008).

[3]Friedberg (2000) showed that the returns to schooling obtained in the country (i.e., Israel) for immigrants was lower as compared to natives (8 and 10 per cent respectively) and that for immigrants, the returns to schooling acquired abroad was even lower (7 per cent).

[4]In order to improve the quality of data on foreigners, the LFS employs a number of *ad hoc* strategies to collect data on the immigrant population. For example, interviews

in households with a foreigner head are made using the Capi technique (Computer assisted personal interviewing) instead of the Cati technique (Computer assisted telephoning interviewing). Moreover, since 2004, further constraints referring to foreigners separately by gender and citizenship have been introduced into the procedure of computing individual weights.

[5]Immigration from these countries is very limited in Italy (it represents just 3 per cent of the whole sample of migrants), and, most importantly, it is very different in terms of education and skills from immigration from the rest of the world.

[6]Despite this sample selection, it is likely that also male migrant employees have quite different characteristics as compared to natives, and this could bias results. To consider this point, in the robustness check, we re-estimate the model enforcing a common support in personal and job characteristics between immigrants and natives.

[7]Results of the *t*-test on the equality of means for migrants and natives show that the means are statistically different from each other for all the variables in Table 1.

[8]Note that the small difference between years since migration and experience in destination country (less than 3 months) is due to a small number of foreigners who have acquired part of their education in Italy.

[9]The LFS provides information on schooling levels (i.e., highest educational level achieved), which was converted in years of education with reference to the Italian educational system. Obviously, in some cases this conversion might be imprecise.

[10]The sample has been split into natives and immigrants, and quartiles for each group have been determined independently. This implies that the quartile cut-offs for the two groups may differ.

[11]Interestingly, experience in home country for immigrants is smaller at higher wage levels, while experience in the domestic country is greater at higher wage levels, although the observed increase is lower as compared to Italians.

[12]Potential work experience is measured as age minus education minus six years, while pre-immigration work experience is equal to age at immigration minus education, minus six years. Since in our sample 97 per cent of immigrants completed their studies before arriving in Italy, we do not split immigrants' education between the parts acquired in home and in destination country. We replicated estimates excluding the few immigrants who completed their education in Italy, but results are unchanged (results are available upon request).

[13]All specifications include regional fixed effects.

[14]Since the school quality indicator is computed on OECD countries, many observations for non-OECD countries are lost.

[15]We also experimented with a specification with quadratic work experience. Although the coefficient on the quadratic term is statistically significant, its size is close to zero, and results do not change when compared to the linear specification. Hence, we only report the most parsimonious (linear) specification.

[16]The high positive immigrants' earnings gap estimated upon arrival, as in columns (3) and (4) in Table 3, can be explained by the fact that there are very few individuals in the sample with less than 10 years of schooling.

[17]The neo-latin Romanian language is quite similar to the Italian language, and Italian TV channels are usually broadcasted on Albanian television. We replicated estimates

splitting European migrants between those coming from Albania and Romania and those coming from other European countries, but we found no statistically significant differences in the penalties between the two groups.

[18]In our sample, this effect is likely to be very small as most immigrants completed their education in their country of origin.

[19]Simon et al. (2011) analyse the determinants of occupational mobility of immigrants between their origin countries and Spain. In line with our results, they find that the downgrading with respect to occupational status in origin is significantly higher for older-at-immigration immigrants.

[20]Obviously, in this way, we account for age-at-arrival effects only to the extent that differences between the two groups are constant below and above 20. We grouped age-at-arrival using different thresholds (i.e., above and below both 25 and 30), and results, available upon request, are qualitatively the same.

[21]As discussed in Chiswick and Miller (2007), occupational fixed effects are generally not included in the earnings equation because they can be considered either as a grouped variant of the dependent variable or an alternative measure of the labour market outcome. Their inclusion, however, can shed light on the indirect channels through which earnings gains are achieved, that is, through occupational attainment. More educated and more experienced workers have in general access to occupations that are ranked higher-up in the occupational ladder and pay higher wages.

[22]As previously noted, this evidence contrasts with that reported by Chiswick e Miller in their study on the U.S using census data (Chiswick and Miller, 2007).

[23]Notice that while estimating equation (1) on the full sample, the returns on pre-immigration work experience were not statistically significant, when estimates are performed separately on natives and migrants' samples, we find that the coefficient, albeit very small, is positive and significant.

[24]We performed the same exercise also using a less aggregated one-digit classification (9 occupational groups), and results, available upon request, support the same conclusions.

[25]In practice, we re-estimated equation (1) with and without occupational controls (i.e. as in Table 3 columns 3 and 5) and reported in Figure 2 the coefficient estimates of the schooling interaction term. We do not perform the same exercise for work experience because the difference between coefficients controlling or not for occupations is not statistically significant and because of the limitations related to cohort effects and selective return migration when analysing the effects of post-migration work experience.

[26]The full set of estimates are not reported here for lack of space, but they are available upon request.

[27]Note that this can also be consistent with the hypothesis that immigrants at the bottom of the distribution are more favourably selected on the basis of unobserved characteristics as compared to immigrants located at the top; hence, the smaller gap could also be attributed in part to higher ability and motivation of immigrants with respect to natives at lower deciles (see Chiswick, 1978).

[28]In particular, we use the geometric mean of earnings in the occupation (i.e., the mean of log earnings) using 37 occupational groups.

Additional file

Additional file 1: Table S1. Baseline earnings equations with control for school quality[a]. **Table S2.** Mean monthly wage (€) by occupation.

Competing interest
The IZA Journal of Migration is committed to the IZA Guiding Principles of Research Integrity. The authors declare that they have observed these principles.

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